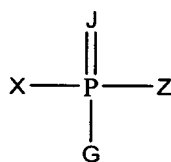


We claim:

1. A method for decomposing an organophosphorus compound comprising subjecting said organophosphorus compound to an alcoholysis reaction in a medium comprising non-radioactive metal ions and at least a trace amount of alkoxide ions, wherein, through said alcoholysis reaction, said organophosphorus compound is decomposed.

2. The method of claim 1, wherein said organophosphorus compound has the following formula (10):



(10)

where:

J is O or S;

X, G, Z are the same or different and are selected from the group consisting of Q, OQ, QA, OA, F, Cl, Br, I, QS, SQ and C≡N;

Q is hydrogen or a substituted or unsubstituted branched, straight-chain or cyclic alkyl group having 1-100 carbon atoms; and

A is a substituted or unsubstituted aryl group selected from the group consisting of phenyl, biphenyl, benzyl, pyridyl, naphthyl, polynuclear aromatic, and aromatic and non-aromatic heterocyclic;

wherein, when X, G, Z are the same,

(i) X, G, Z are not Q; or

(ii) Q is not H; and

wherein said substituents are selected from the group consisting of Cl, Br, I, F, nitro, nitroso, Q, alkenyl, OQ, carboxyalkyl, acyl, SO<sub>3</sub>H, SO<sub>3</sub>Q, S=O(Q), S(=O)<sub>2</sub>Q, amino, alkylamino (NHQ), arylamino (NHA), alkylaryl amino, dialkylamino and diarylamino.

3. The method of claim 1, wherein said medium is a solution further comprising a solvent selected from the group consisting of methanol, substituted and unsubstituted primary, secondary and tertiary alcohols, alkoxyalkanol, aminoalkanol, and combinations thereof.

4. The method of claim 1, wherein said organophosphorus compound has at least one phosphorus atom double bonded to an oxygen or a sulfur atom.

5. The method of claim 1, wherein said medium further comprises a non-inhibitory buffering agent.

6. The method of claim 5, wherein said buffering agent is selected from the group consisting of anilines, N-alkylanilines, N,N-dialkylanilines, N-alkylmorpholines, N-alkylimidazoles, 2,6-dialkylpyridines, primary, secondary and tertiary amines, trialkylamines, and combinations thereof.

7. The method of claim 1, wherein said medium is a solution further comprising a solvent selected from the group consisting of methanol, ethanol, n-propanol, *iso*-propanol, n-butanol, 2-butanol, methoxyethanol, and combinations thereof.

8. The method of claim 7, wherein said solution further comprises a solvent selected from the group consisting of nitriles, esters, ketones, amines, ethers, hydrocarbons, substituted hydrocarbons, unsubstituted hydrocarbons, chlorinated hydrocarbons, and combinations thereof.

9. The method of claim 1, wherein said medium further comprises alkoxide ions in addition to said at least a trace amount of alkoxide ions.

10. The method of claim 9, wherein the concentration of said alkoxide ions is about 0.1 to about 2 equivalents of the concentration of the metal ions.

11. The method of claim 9, wherein the concentration of said alkoxide ions is about 1 to about 1.5 equivalents of the concentration of the metal ions.

12. The method of claim 1, wherein said medium is prepared by combining a metal salt and an alkoxide salt with at least one of alcohol, alkoxyalkanol and aminoalkanol.

13. The method of claim 1, wherein said metal ions are selected from the group consisting of lanthanide series metal ions, transition metal ions, and combinations thereof.

14. The method of claim 1, wherein said metal ions are selected from the group consisting of lanthanide series metal ions, copper, platinum, palladium, zinc, nickel, yttrium, scandium ions, and combinations thereof.

15. The method of claim 1, wherein said metal ions are selected from the group consisting of  $\text{Cu}^{2+}$ ,  $\text{Pt}^{2+}$ ,  $\text{Pd}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Y}^{3+}$ ,  $\text{Sc}^{3+}$ ,  $\text{Ce}^{3+}$ ,  $\text{La}^{3+}$ ,  $\text{Pr}^{3+}$ ,  $\text{Nd}^{3+}$ ,  $\text{Sm}^{3+}$ ,  $\text{Eu}^{3+}$ ,  $\text{Gd}^{3+}$ ,  $\text{Tb}^{3+}$ ,  $\text{Dy}^{3+}$ ,  $\text{Ho}^{3+}$ ,  $\text{Er}^{3+}$ ,  $\text{Tm}^{3+}$ ,  $\text{Yb}^{3+}$ , and combinations thereof.

16. The method of claim 1, wherein said metal ions are lanthanide series metal ions.

17. The method of claim 16, wherein said lanthanide series metal ions are selected from the group consisting of  $\text{Ce}^{3+}$ ,  $\text{La}^{3+}$ ,  $\text{Pr}^{3+}$ ,  $\text{Nd}^{3+}$ ,  $\text{Sm}^{3+}$ ,  $\text{Eu}^{3+}$ ,  $\text{Gd}^{3+}$ ,  $\text{Tb}^{3+}$ ,  $\text{Dy}^{3+}$ ,  $\text{Ho}^{3+}$ ,  $\text{Er}^{3+}$ ,  $\text{Tm}^{3+}$ ,  $\text{Yb}^{3+}$ , and combinations thereof.

18. The method of claim 1, wherein said metal ions are selected from the group consisting of  $\text{Cu}^{2+}$ ,  $\text{Pt}^{2+}$ ,  $\text{Pd}^{2+}$ ,  $\text{Zn}^{2+}$ , and combinations thereof.

19. The method of claim 1, wherein said metal ions are selected from the group consisting of  $\text{Y}^{3+}$ ,  $\text{Sc}^{3+}$ , and combinations thereof.

20. The method of claim 1, wherein said metal ion is  $\text{La}^{3+}$ .

21. The method of claim 1, wherein said organophosphorus compound is a pesticide.

22. The method of claim 1, wherein said organophosphorus compound is an insecticide.

23. The method of claim 1, wherein said organophosphorus compound is paraoxon.

24. The method of claim 1, wherein said organophosphorus compound is a chemical warfare agent.

25. The method of claim 24, wherein said organophosphorus compound is a G-agent.

26. The method of claim 24, wherein said organophosphorus compound is selected from the group consisting of VX and Russian-VX.

27. The method of claim 24, wherein said organophosphorus compound is a nerve agent.

28. The method of claim 24, wherein said chemical warfare agent is combined with a polymer.

29. The method of claim 1, wherein said medium further comprises one or more ligands.

30. The method of claim 29, wherein said ligand is selected from the group consisting of 2,2'-bipyridyl, 1,10-phenanthryl, 2,9-dimethylphenanthryl, crown ether, and 1,5,9-triazacyclododecyl.

31. The method of claim 29, wherein said ligand further comprises solid support material.

32. The method of claim 31, wherein said solid support material is selected from a polymer, silicate, aluminate, and combinations thereof.

33. The method of claim 1, wherein said medium is a solid.

34. The method of claim 1, wherein said medium is a solution

35. . The method of claim 34, wherein said solution is disposed on an applicator.

36. The method of claim 9, wherein the concentration of said alkoxide ions is about 0.01 to about 2 equivalents of the concentration of the metal ions.

37. The method of claim 9, wherein the concentration of said alkoxide ions is about 0.5 to about 1.5 equivalents of the concentration of the metal ions.

38. A kit for decomposing an organophosphorus compound comprising a substantially non-aqueous medium for an alcoholysis reaction, said medium comprising non-radioactive metal ions and at least a trace amount of alkoxide ions.

39. The kit of claim 38, wherein said medium is contained in an ampule.

40. The kit of claim 38, comprising an applicator bearing the medium, said applicator being adapted so that the medium is applied to the organophosphorus compound and the compound decomposes.

41. The kit of claim 38, further comprising written instructions for use.